

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

Hassan Mostafavi

Application No. 10/664,213

Filed: September 16, 2003

For: **LOCALIZATION OF A TARGET USING  
IN VIVO MARKERS**

Examiner: Jonathan Cwern

Group Art Unit: 3737

Confirmation No. 3361

**REPLY BRIEF**

Mail Stop Appeal Brief-Patents  
Commissioner for Patents  
Post Office Box 1450  
Alexandria, Virginia 22313-1450

Dear Sir:

Appellant submits the following Reply Brief pursuant to 37 C.F.R. §1.193(d) for consideration by the Board of Appeals and Interferences ("Board"). This Reply Brief is responsive to the Examiner's Answer of March 22, 2011 ("Answer").

**Appeal Brief's Arguments Stand**

Appellant believes that the arguments of the Appeal Brief filed February 23, 2011 ("Appeal Brief") are still valid. Thus, this document will sequentially address some of the errors and new issues raised by the Examiner's Answer.

## Arguments

### I - Overview

As compared to the Final Office Action, the new arguments in the Answer are at page 11, lines 14-15 and 18-22; page 12, lines 1-2 and 10-15; page 13, lines 1-2 and 12-22; and page 14, lines 1-4. The claims appear to be rejected based on adding the teachings of Mate, which describe using implanted RF excitable markers for RF location tracking, to the teachings of Cosman, which describe using an optical tracking system and x-ray imaging of external markers. The rejection then appears to expand the x-ray imaging of Cosman by adding the kV and MV energy x-ray imaging of Jaffray. Finally, the rejection appears to remove the RF tracking of RF excitable markers as taught Mate and the optical tracking system imaging of external markers taught in Cosman, so that all that remains is the x-ray imaging of Cosman as modified by kV and MV energy imaging of Jaffray, to image the implanted RF markers of Mate. However, this presents two problems.

### II – First Error

First, the Examiners citations and arguments do not consider the references in their entirety (MPEP § 2141.02.VI, and § 2145.X.D.1-2), the references' intended purposes (MPEP § 2141.02.V), or the references' principle of operations (MPEP § 2141.02.VI).

For example, the rejection isolates parts of Mate (e.g., see page 5 lines 2-8 of the Final Office Action; and page 11, lines 5-11 of the Answer), and ignores the intended purpose and principle of operation set forth in Mate (e.g., see Abstract, Summary, and at least paragraphs 35-39, 41 and 60-62) which are to use RF “imaging” of RF excitable markers 30 so that the markers can be located by external RF sensors 36 to track the actual position of target isocenter 40 in real time (e.g., by polling the sensors twelve or more times a minute) during radiation therapy to ensure that the target isocenter does not move to an unacceptable amount (see at least paragraphs 35, 37 and end of 39). Applicants note that RF sensing is really not “imaging” but rather pinpointing spatial locations that can be displayed on a display (see paras. 36-37 of Mate); thus no physical image has been created in the context of what is claimed. That is, Mate does not portray an exposure of a captured, scanned, sensed, or received physical impression, such as in

the claimed context of “imaging”, but instead Mate adds the calculated locations of the measured RF signals of the markers to prior image data to provide a simulated model that shows the calculated marker locations (see paras. 36-37 and 60-62; and Figs. 11-12 of Mate). Thus, paragraph 74 of Mate cannot be viewed by itself to ignore the intended purpose and principle of operation of Mate. In any event, paragraph 74 requires that any locating steps operate “in accordance with the claims”, and every claim requires RF excitable markers.

Similarly, the rejection isolates parts of Cosman (e.g., see page 4 lines 5-10 of the Final Office Action and page 10, lines 4-16 of the Answer), and ignores the intended purpose and principle of operation set forth in Cosman (e.g., see at least Abstract; Summary paragraphs 8-9; paragraphs 24-41, 52, 61, 64-65, 78, 89, 92, 101, 105, and 109) which are to have external optical markers on a patient’s body imaged by a camera in a known position with regard to a treatment machine. This way, the optical markers, which correlate to reference points of internal scans, can bridge the gap between the external positioning of the treatment beam, and the internal positioning of anatomical targets to be treated (Id.). Thus, the patient P is moved to align the target with the isocenter of the beam B (para. 66, 79, etc.). Appropriate treatments include frameless stereotaxy or stereotactic surgery, such as neurosurgery (para. 6). Thus, paragraphs 63 and 67 of Cosman cannot be viewed by itself to ignore the intended purpose and principle of operation of Cosman.

For example, the Examiner’s assertion (see Answer page 11, lines 17-19) that the combination of references is appropriate because it would have been obvious “to have modified the system of Mate et al. by adding onto...the x-ray-imaging marker location technique of Cosman”, still requires the RF excitable markers of Mate, by definition. Next, the Examiner’s assertion (Id.) that the combination of references is appropriate because it would have been obvious “to have modified the system of Mate et al. by...substituting the x-ray imaging marker locating technique of Cosman” destroys the principle of operation and primary purpose of Mate, by removing the RF excitable markers and location system used to track the actual position of target isocenter 40 in real time during radiation therapy (see at least paragraphs 35, 37 and end of 39). Next, Applicant is unsure how either such “adding onto” or “substituting” will provide the Examiner’s asserted motive for combining the references (page 11, line 20 through page 12, line

1 of the Answer), which is to “improve the accuracy of the Mate et al. system through ‘further refinement’ by the x-ray imaging technique taught by Cosman”.

In any event, the Examiner’s interpretation of Cosman (e.g., see page 4 lines 5-10 of the Final Office Action and page 10, lines 4-16 of the Answer) appears inaccurate and unreasonable. The “index markers” mentioned at the end of paragraph 67 of Cosman refer to Cosman’s external markers that are either secured to the patient’s skin (see paragraphs [0057]-[0060]) or attached to bone but exposed to the camera (e.g., they are internal studs that have external markers extended so that they are “visible” to camera; see paragraph [0061] and Figure 3C). Paragraph 67 requires “index marker” and every definition in Cosman of an “index marker” is a marker, that can be mounted on the patients external or internal anatomy, but that is able to be externally, optically imaged by the external camera(s) (see paragraphs 29, 33, 35, 37, 39, 41, 48, 52, 55, 56, 67, 70-72, 85-89, 91, 95, 97, 99-109). For instance, the claim 1, phrase 4 explains that the scanner marker coordinates (e.g., x-rays of the markers) are transformed “to said optical marker coordinates.” Applicant believes that the only markers described in Cosman are index markers that must be imaged by the camera. Applicants cannot find any evidence or enablement of markers that are not index markers such as, completely internal and non-camera imageable markers in Cosman (e.g., being imaged by x-ray) as alleged by the Examiner. Consequently, Appellants do not believe that Cosman teaches what it is asserted by the Examiner to teach; or that Mate can be properly combined with Cosman.

## II – Second Error

Second, neither the camera tracking or x-ray imaging Cosman teach any “imaging modalities” for imaging markers that are “implanted completely internally in a body internally in a body,” as required by claim 1. The argument in the paragraph above applies here as well. That is, the combination of references still does not teach or enable a method comprising: imaging a plurality of markers in a first imaging modality, wherein at least a plurality of the markers are implanted completely internally in a body; determining first coordinates of the plurality of markers relative to a first beam isocenter and internal to the body; imaging the plurality of markers in a different second imaging modality; and determining second coordinates of the plurality of markers relative to a second beam isocenter and internal to the body, wherein at least

a plurality of said markers are implanted in soft tissue of the body, wherein the first beam isocenter is a planned treatment beam isocenter and the second beam isocenter is a treatment machine beam isocenter at a time of treatment, and wherein the first imaging modality is CT and the second imaging modality is one of kilo volt (kV) and mega volt (MV) imaging, as required by claim 1. For example, the RF sensing of Mate is really not “imaging” but rather pinpoint spatial locations that can be displayed on a display. However, in Mate, no physical image has been created in the context of what is claimed. Mate does not portray an exposure or a physical impression, such as in the claimed context of “imaging”, but instead adds the calculated locations of the measured RF signals of the markers a prior image (see paras. 36-37 and 60-62; and Figs. 11-12 of Mate).

### III – Third Error

It appears that the Final Office Action and Answer have ignored the inherent properties and benefits of the claims noted in the Brief at page 14, paragraph 3 (starts with “Next, the Office Action cites motivation of adding...”) and page 16, paragraph 2 (entitled “The References Do Not Provide Benefits Of Embodiments Of Claim 1”) (see MPEP § 2141.02 V). The references do not contemplate or provide such benefits.

### IV – Sequentially Addressing Other New Arguments Added in the Answer

Next, the statement in the Answer (see page 12, lines 1-2) that “such a combination does not require the use of optical imaging techniques” appears to be new grounds of rejection. This assertion ignores the intended purpose and principle of operation of Cosman, which requires and only teaches external markers, which are at least optical camera imaged.

Regarding the Answer page 12, lines 3-7, Applicants believe a practitioner would understand that the claims do not include markers detected by an RF signal, as argued by the Examiner, and that determining the coordinates would be done using the images, such as required by claim 62. Regarding page 12, lines 8-15, the initial argument above applies to show that modifying Mate and Cosman with the KV and MV imaging of Jaffray requires destroying the principle of operation and primary purpose of the RF image markers of Mate, and of the camera image markers of Cosman.

The Examiners argument on Page 12, lines 16-21 of the Answer is addressed by the arguments above in II – First Error. For example, the combination of Mate and Cosman resulting in Mate using “imaging to locate markers rather than an RF signal” destroys the principle of operation and primary purpose of Mate since each embodiment and each claim of Mate requires an RF excitable marker.

The Examiners argument on page 13, lines 1-11 is addressed by the argument above in II – First Error.

Next, the Examiners argument on page 13, lines 11-16 appears to be new grounds of rejection. Applicants assert that there is no description in Cosman to support the Examiners assertion that by referring to “radial opaque markers”, “it is clear that these are not optical markers” or that “radial opaque is used to refer to markers which are detected by an x-ray system (not a camera)”. This argument is addressed by the argument above in II – First Error and II – Second Error. In addition, there is no reason a “radiopaque” marker can not also be optically imaged with a camera (e.g., imaging the same markers with a camera and by x-ray is what Cosman teaches). Moreover, since the purpose and principle of operation of Cosman is to use optical markers that can be imaged by a camera, this statement appears unreasonable.

Regarding lines 17-22 of page 13 of the Answer, please see the argument above regarding page 12, lines 16-21 of the Answer.

Regarding lines 1-4 of page 14 of the Answer, these arguments by the Examiner appear to be new grounds.

### **Applicability of Arguments**

Insofar as the Examiner refers to the arguments addressed above in connection with various other claims or claim groups, Appellant submits that the same arguments set forth above apply to each occurrence of the counter argument in the Examiner’s Answer.

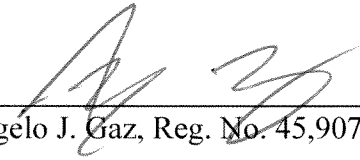
**Conclusion and Relief**

Based on the foregoing, Appellant requests that the Board overturn the Examiner's rejection of all pending claims and hold that all of the claims of the present application are allowable.

Respectfully submitted,

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Date: 2011-05-23

  
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**CERTIFICATE OF TRANSMISSION**

I hereby certify that this correspondence is being submitted electronically via EFS Web on the date shown below to the United States Patent and Trademark Office.

  
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Jessica Huester

2011-05-23  
Date